REMARKS/ARGUMENTS

Amendments

Claim 1 has been amended to recite that the hot gas cooled by the present process is a gas from a partial oxidation reactor that is connected by means of a horizontal duct to a vessel containing a heat exchange tube, and that the upstream part of the heat exchange tube is positioned in the horizontal duct and is sealingly attached to a tube sheet that is also positioned in the horizontal duct. It is the upstream part of the tube and front of the tube sheet positioned in the horizontal duct that are cooled by a mixture of a fresh liquid cooling medium and defined part of the liquid cooling medium used to cool the main part of the tubes. Support for these amendments is found on page 7 of the specification, lines 3-5, in the detailed description of the drawings on pages 5-11 of the specification, and Figs. 1-6, all of which show the upstream part of the tube 4 and the tube sheet or plate 2a positioned in the horizontal duct connecting reactor 1 to heat exchange vessel 2. That the front of tube sheet 2a is cooled by the combined mixture is disclosed on page 7 of the specification, lines 12-14.

Claim 2 has been amended to specify the fresh cooling medium and the extracted cooling medium are both liquids as specified in claim 1.

Claim 6 has been amended to specify the upstream end of the heat exchange tube and the tube sheet to which they are sealingly attached are both positioned in the horizontal duct connecting the partial oxidation reactor to the heat exchange vessel. Support for these amendments can be found in same parts of the specification and drawings as cited in connection with the amendments to claim 1.

Claim 7 has been amended to specifically recite there is an opening between the annular sleeve and upstream end of the heat exchange tube through which the combined mixture of extracted cooling medium and fresh cooling medium passes. Support for these amendments is found on page 7 of the specification, lines 16-21 and in Figs. 2-6 which show opening 21 between annular sleeve 12 and the upstream end of tube 4.

Claim 9 has been amended to recite the cooling medium compartment is divided into a plurality of compartments, including a first compartment from which the cooling medium is extracted (compartment 15 in Fig. 2) and a second compartment into which the combined mixture is supplied (compartment 20 in Figs. 2-6). The second compartment is specified to be positioned in the horizontal duct as shown in Figs. 2-6

New claims 10 and 11 are directed to the embodiment of the invention wherein an injector is positioned in the wall dividing the first and second compartments in order to inject the

combined mixture into the compartment surrounding the upstream end of tube 4. Support for claim 10 is found on page 8 of the specification, lines 24-30, and Figs. 3 and 4, which show injector 23 in the wall dividing compartment 20 from compartment 15 or 7.

New claim 12 is directed to a process in which relatively cool cooling medium is supplied to elevated position in the heat exchange vessel to establish natural circulation as discussed on page 9 of the specification, lines 12- 25, and shown in Fig. 5.

New claim 13 is directed to a process in which both fresh cooling medium and extracted cooling medium are supplied to an elevated position in the heat exchange vessel, as discussed in the paragraph bridging pages 9 and 10 of the specification and shown in Fig. 6.

New claim 14 is directed to an important feature of the present process that the inlet section of the upstream tubular part in the horizontal duct will continue to be cooled by the extracted cooling medium in the event the supply of fresh cooling medium is interrupted, as discussed on page 4 of the specification, lines 20-30.

Claim Objection

The amendments to claim 1 are believed to address the objection raised on page 5 of the subject Office action. The word “said” now precedes “main tubular part” in claim 1.

Rejection Based on Brucher

The rejection of claims 1, 6 and 7 under 35 USC § 102 (b) as being anticipated by Brucher (US 6,148,908) is respectfully traversed.

An important feature of present process and apparatus is that a mixture of extracted liquid cooling medium and fresh liquid cooling medium be used to cool the upstream tubular part of the heat exchange tube. In this regard it is noted that the material extracted through upper tube 18 in Fig. 3 of Brucher is not a liquid cooling medium as required by the present claims. Rather, the cooling medium extracted through line 18 in Brucher appears to be steam, since the fluid in line 18 is passed to a steam collecting drum 20. Thus, Brucher does not disclose extracting a liquid cooling medium and hence does teach or suggest a using a mixture of extracted liquid cooling medium and fresh liquid cooling medium to cool the upstream end of a heat exchange tube.

Another important feature of the present process and apparatus is that the upstream tubular part be sealingly connected to a tube sheet, and that both of these (i.e., the upstream tubular part and the tube sheet) be positioned in the horizontal duct between the partial

oxidation reactor and the heat exchange vessel. These features, which are now recited in amended claims 1, 6 and 7, are not disclosed in Brucher as discussed below.

While the heat exchanger in Brucher is connected to a process gas generator by means of a horizontal duct (horizontal transfer line 4 in Figs. 1-4), the upstream end of cooling tube 11 in Fig. 4 of Brucher is not positioned in horizontal transfer line 4. Instead, the upstream end of cooling tube 11 is positioned well above horizontal transfer line 4 and is connected to horizontal transfer line 4 by means of connecting tube 22. Moreover, if thin floor 16 in Fig. 4 of Brucher is considered to be a tube sheet, it too is positioned above horizontal transfer line 4, instead of in the horizontal duct as required by the amended claims.

Since the aforementioned features, which are recited in amended claims 1, 6 and 7, are not taught or suggested by Brucher, the present claims are believed to be patentable thereover. Accordingly, it is respectfully requested the rejection based on Brucher be withdrawn.

Rejection Based on Richter et al

The rejection of claims 1, 6 and 7 under 35 USC § 102 (b) as being anticipated by Richter et al (US 3,915,224) is respectfully traversed.

As discussed above, an important feature of the present process and apparatus is that the upstream tubular part be sealingly connected to a tube sheet, and that both of these (i.e., the upstream tubular part and the tube sheet) be positioned in the horizontal duct between the partial oxidation reactor and the heat exchange vessel. These features, which are now recited in amended claims 1, 6 and 7, are not disclosed in Richter et al as discussed below.

While Richter et al has a horizontal duct (i.e., the horizontal duct leading into the brick lined inlet housing 2 in the Figure), the upstream ends of cooling tubes 3 of Richter et al are not positioned in the horizontal duct. Instead, they are positioned inside of process gas cooler 1. In addition, the heat exchange tubes 3 are not sealingly connected to a tube sheet that is also positioned in the horizontal duct. There is no specific disclosure of a tube sheet in Richter et al. Even if the bottom of process gas cooler 1 in Richter et al was deemed to be a tube sheet, this "tube sheet" would be part of the process gas cooler 1 (and therefore would be positioned in the process gas cooler). It would not be positioned in the horizontal duct as required by the amended claims. It is noted that there are no heat exchange tubes, or tube sheets, or cooling medium in the horizontal duct leading into inlet housing 2 in Richter et al. The only purpose of the horizontal duct in Richter et al is to supply hot gas to inlet housing 2. There is no teaching or suggestion in Richter et al that heat exchange tubes or tube sheets should be located in the horizontal duct.

Since the aforementioned features recited in amended claims 1, 6 and 7 are not taught or suggested by Richter et al, the claims in their present form are patentable thereover. Accordingly, it is respectfully requested the rejection of claim 1, 6 and 7 based on Richter et al be withdrawn.

Rejection of Claims 2-5 Based on Richter et al

The rejection of claims 2-5 under 35 U.S.C. § 103(a) as being unpatentable over Richter et al (US 3,915,224), is respectfully traversed.

As discussed above, Richter et al does not disclose certain important features of Applicant's claimed invention, for example, that the upstream tubular part and the tube sheet to which it is sealingly connected must both be positioned in the horizontal duct between the partial oxidation reactor and the heat exchange vessel. Therefore, Richter et al does not disclose an "apparatus and process for cooling hot gas as claimed", at least not as claimed in amended claims 1, 6 and 7. The amended claims require that both the upstream tubular part and tube sheet be positioned in the horizontal duct. Neither Richter et al alone, or in combination with the other cited references, teaches or suggests this feature. Since claims 2-5 depend from claim 1, they contain the aforementioned limitations of amended claim 1 and therefore are likewise patentable over Richter et al.

Rejection of Claims 8-9 Based on Richter et al in view of Schuurman

The rejection of claims 8 and 9 under 35 U.S.C. § 103(a) as being unpatentable over Richter et al (US 3,915,224) in view of Schuurman (US 4,029,054), is respectfully traversed.

As discussed above, while Richter et al discloses a horizontal duct connected to inlet housing 2, Richter et al does not teach or suggest positioning the upstream end of a heat exchange tube (and the tube sheet to which it is attached) in the horizontal duct between the reactor and heat exchange vessel. Also, as noted in the subject Office action, Richter et al does not disclose means to supply part of fresh cooling medium to an elevated portion in the heat exchange vessel.

The Examiner relies on Schuurman to overcome this deficiency of Richter et al. However, this reliance is misplaced, because Schuurman does not in fact disclose supplying part of the fresh cooling medium to an elevated portion in the vessel.

As explained in column 8, lines 23-26, of Schuurman, coolant supply line 9 issues into the lower end of concentric tube 18, which is connected to separation plate 11 which is situated in the bottom of the heat exchange vessel. Therefore, while supply line 9 itself enters the waste

heat boiler of Schuurman near the top of the vessel, the coolant passing through supply line 9 is supplied to the lower end of inner tube 18 at or near the bottom of the vessel. Therefore, Schuurman, alone or in combination with Richter et al, does not teach or reasonably suggest the subject matter of claim 8, or new claims 12 and 13, all of which require supplying coolant to an elevated position in the heat exchange vessel.

Amended claim 9 is dependent on claim 6, and in addition to the limitations of claim 6 discussed above, contains the limitation that the cooling medium compartment be divided into a first and second compartment, the latter of which is positioned in the horizontal duct between the partial oxidation reactor and the heat exchange vessel. Neither Richter et al or Schuurman teach or suggest placing a compartment for receiving a mixture of fresh and extracted cooling medium in the horizontal duct.

For all the above reasons and in view of the amendments, claims 1-9, and new claims 10-14, are believed to be patentable over the cited references.

Accordingly, reconsideration and favorable action of the application is respectfully requested.

Respectfully submitted,

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